

PAPER PLANES



Brandon Hansen and Kris Lightfoot



paper planes



Mud Puddle Books
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***by brandon hansen
and kris lightfoot***



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introduction

All You Need:

A piece of 8½ X 11" (A4) lightweight paper

A smooth surface

Note: photocopy, printer, and scrapbook paper will all work. Do not use binder paper with lines - it is too light, and cardstock is too heavy.

IMPORTANT NOTES

Perfect Folds

Paper planes that actually fly must begin with perfect folds. Take your time, measure accurately, line up edges, crease neatly and firmly.

Symmetry

Every paper plane must be exactly the same on both sides. The right wing must be a mirror image of the left wing or your plane will either not fly straight or not fly at all. If you make a mistake on the first side of your airplane make the same mistake on the second side. If the first side is perfect and you make a mistake on the second side, throw away your piece of paper and start again!

THE THROW

The first two or three throws with any paper airplane must be light and breezy. No matter how perfect your folds are or how good your symmetry is, if you throw too hard in the beginning your plane will crash! Once it begins flying the way you think it should, then you can throw as hard and as far as you want to.

Throw, Check, & Tweak

If you cannot get your plane to fly just right take a minute and check the folds, the symmetry, the dihedral (wing angle) (see page 7), as well as the elevators and ailerons (see page 7). The best way to check your plane is to hold your plane up to your eye and stare right down the middle. This will help you make sure you have made all of the folds the same on both sides and that the wings angle upward.

Second Try

If you cannot make your plane fly, regardless of how perfect it looks, take a deep breath, and make a second plane from a different piece of paper. Sometimes there is just no explaining it – certain paper airplanes just will not fly!

FOLDING & TWEAKING

1. Aligning

Most of the planes in this book require folds that are edge-to-edge, corner-to-corner, or edge-to-crease folds. When you make these folds, make sure you put the paper exactly where it is supposed to go. Even a slightly crooked fold will make a difference.

2. Creasing

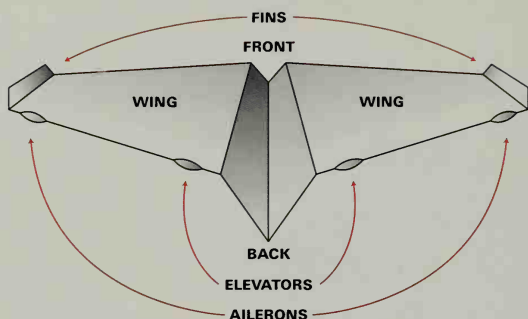
Every fold must be creased and creased well. First, run your finger from the middle of the fold to one end, then repeat to the other end. Next, check your alignment to make sure all of the edges are where they are supposed to be. Now run back over the top of the crease with your fingernail – again beginning in the center and creasing to one end, then repeat to the other end.

3. Smoothing

Whenever a paper airplane has several folds you will notice after one or two folds that your paper will begin to bubble up or bulge. It is best if you flatten these the minute you notice them. To do this, use a pencil, a dowel, or a bone folder* to sweep over the bulge with enough pressure that the bulge is eliminated.

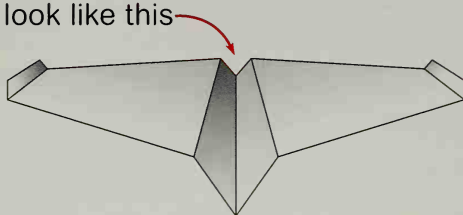
*Bone Folders, used specifically for creasing paper, are commonly available in stationary, craft and art stores.

PARTS OF THE PAPER AIRPLANE



Dihedral

The angle between a plane's wings is what an engineer will call the "Dihedral". Every winged airplane flies best with a positive dihedral, which means that your plane must look like this when you look at it from the tail.



Elevators

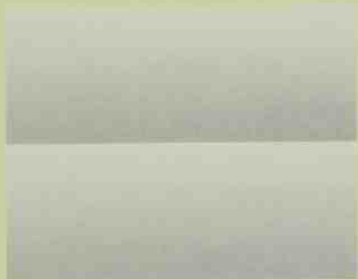
The small flaps in a plane's wings that make the plane go up and down are the "Elevators". A plane with up elevators will fly higher and longer, while a plane with down elevators will prevent a plane from flying too high and diving. (Refer to diagram above.)

Ailerons

Ailerons look just like elevators but are at the ends of the wings, not in the middle. An aileron will make a plane bank or roll. An aileron in the right wing of a plane will make it bank and turn left, an aileron in the left wing makes it bank and turn right. (Refer to diagram above.)

the rocket

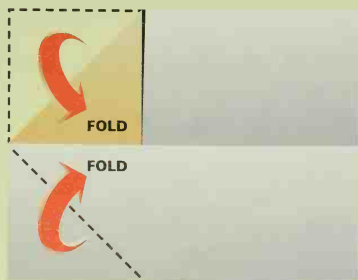
1



Lay paper horizontally on tabletop, fold paper in half lengthwise, crease, unfold.

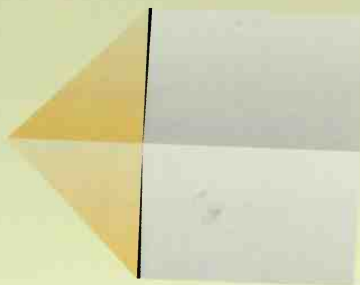
2

Fold upper left edge corner of paper to meet center fold, crease. Repeat with lower left-hand corner.



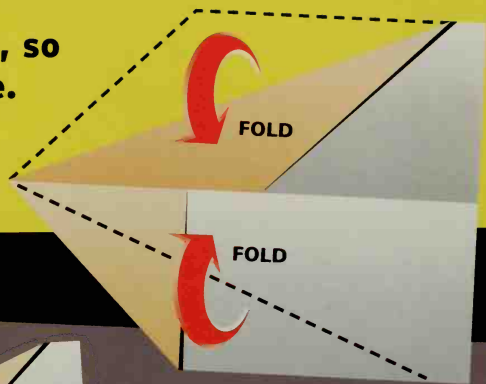
3

Your plane should look like this:

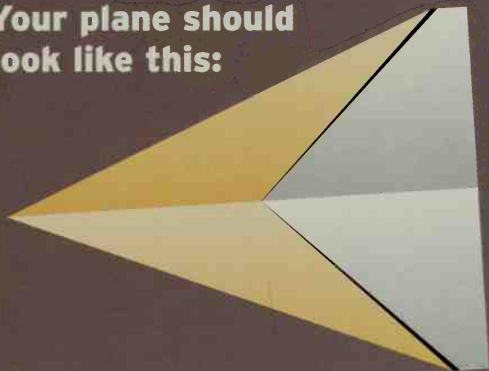


4

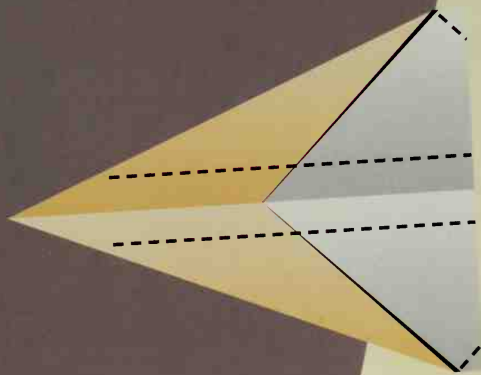
Fold corners over again, so they meet in the middle.

**5**

Your plane should look like this:

**6**

Now you can make some final folds to prepare this plane for flight. Fold along the dotted lines shown in the diagram to give your plane a personal touch. Now go give it a test flight!



Tip: Don't throw this one too hard. A gentle to medium-strength launch is fine.

hang glider



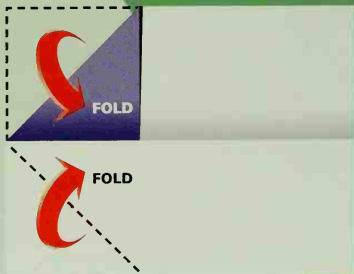
1

Lay paper horizontally on tabletop, fold in half lengthwise, crease, unfold.

2

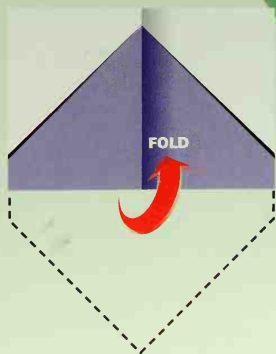
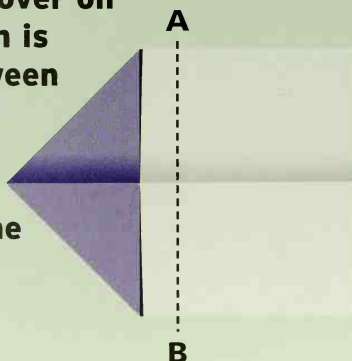
Fold upper left-hand corner to center lengthwise fold line, crease.

Repeat with lower left-hand side.

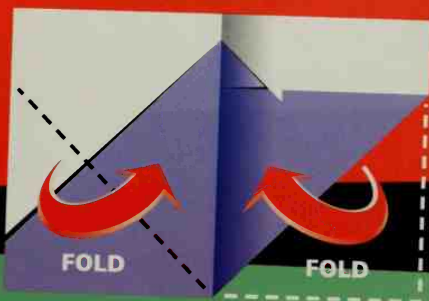


3

Fold triangle over on line AB—which is half-way between the bottom of the triangle and the midpoint of the paper—crease. Rotate paper.

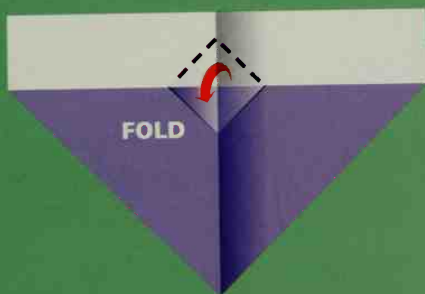


4



Fold lower right-hand corner to meet middle, crease. Repeat with lower left-hand corner.

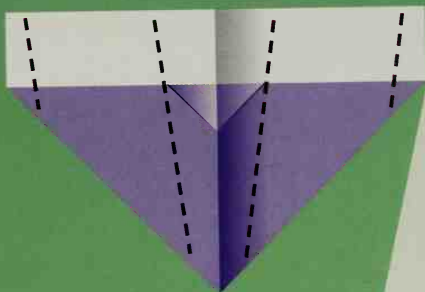
5



Fold the small triangle peeking out from under the folds up over the center, crease.

6

Fold the plane down the center, fold along the dotted lines shown on the diagram.

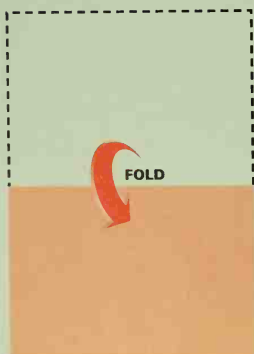


Tip: Use your thumb and index finger to hold the plane closely to the nose and use a hard throw.

swing wing



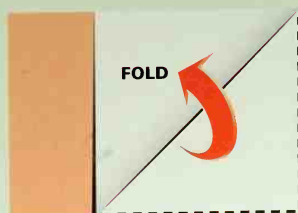
1



Lay paper vertically on tabletop, fold paper in half top to bottom, crease.

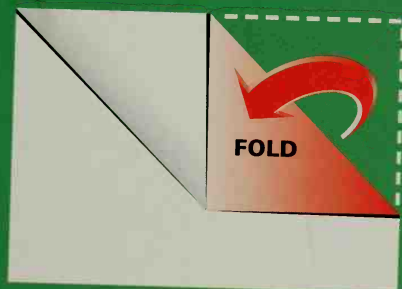
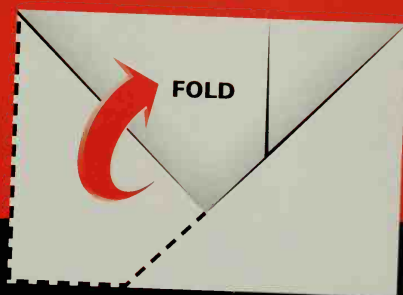
2

Fold right corner of top layer outward so that it meets center fold, crease.

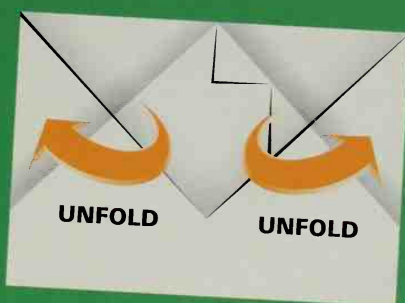
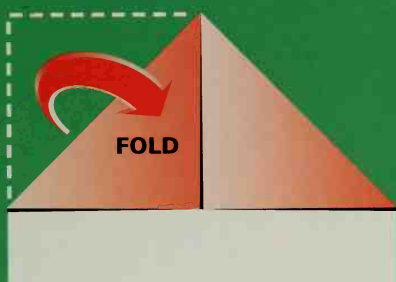




Repeat Step 2 with left corner. The top layer, should now look like an inverted triangle.



Fold the upper right-hand corner down to meet the tip of the triangle, crease. Repeat with upper left-hand corner, unfold.

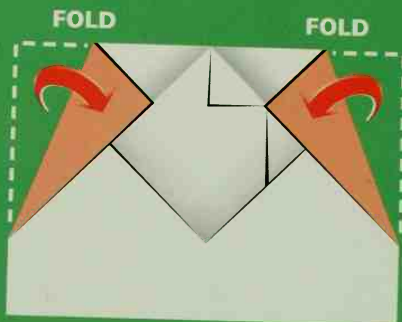


Tip: Point this plane straight ahead and use a good hard throw.



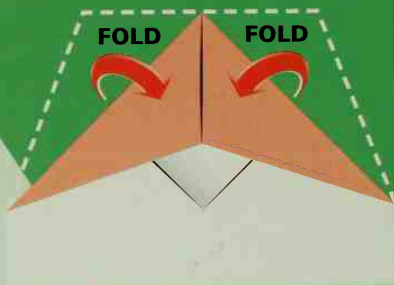
5

Fold the right-hand corner to meet the crease you made in Step 4, crease. Repeat with left-hand corner.



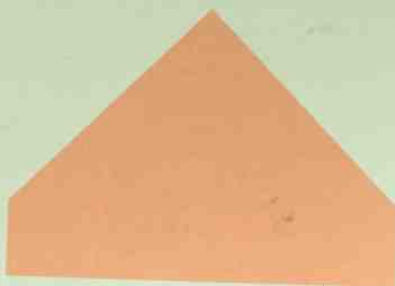
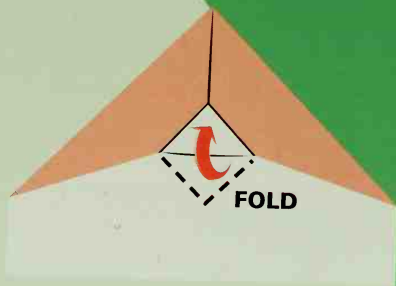
6

Refold on right-hand side to meet crease made in Step 4, crease. Repeat with left-hand side.



7

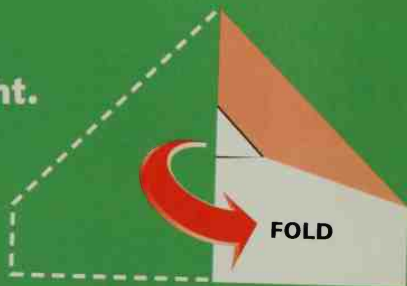
Fold the small triangle peeking out under the folds up over the center, crease, flip over.



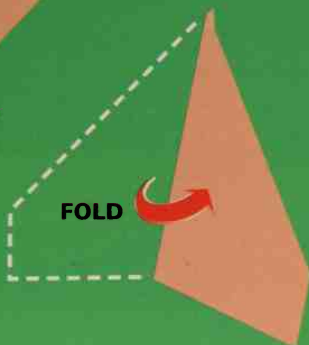
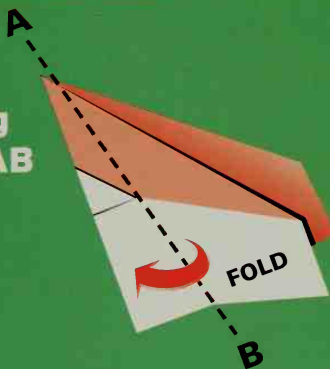


Fold in half from left to right.

Note: Make sure all of the edges line up before you crease your fold.



Fold the top wing down along the AB line, crease, flip over.

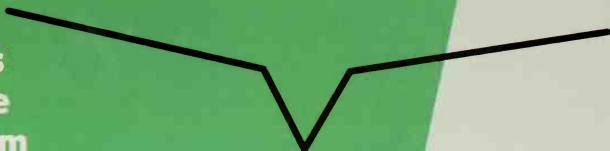


Fold the second wing on top of the first.

Note: Line up edges very carefully.



Unfold both wings so that your plane looks like this from the tail section:





Make fins on both wings by folding the ends of the wings about 1/2" (1.27 cm) from the end of the wing.

Pilot's Secret:

For big, arching loops, increase the elevators on the back edge of the plane and throw straight towards the sky.

For a slow long glide, flatten the fins.

For dart-like flights, flatten the elevators and stick fins straight up.

scott's plane

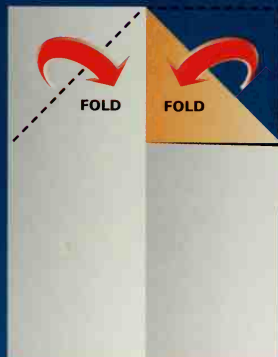
1



Lay paper vertically on tabletop, fold paper in half lengthwise, crease, unfold.

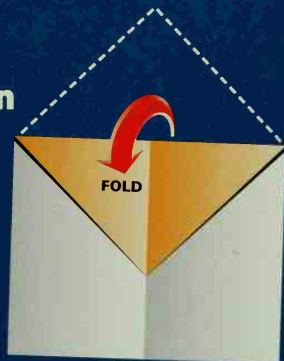
2

Fold top two corners to meet center fold line, crease.

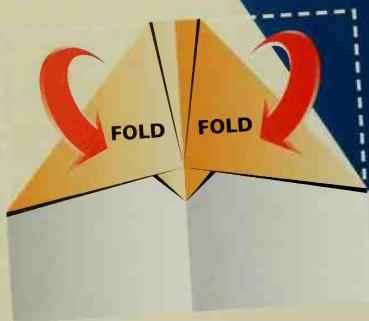


3

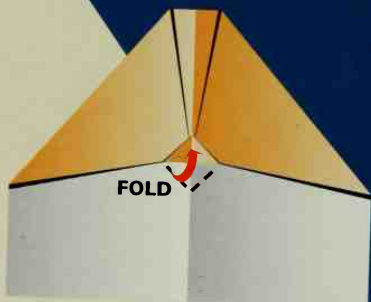
Fold top triangle down over center, crease.



4



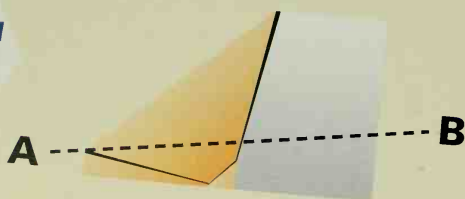
Fold the right corner to meet centerfold, crease. Repeat with left corner.



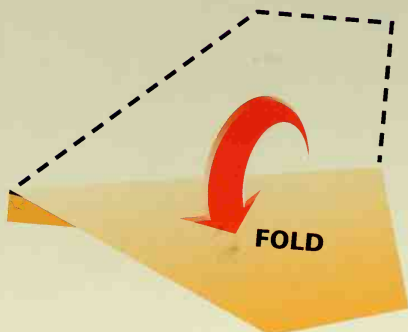
5

Fold the small triangle peeking out from under the folds created in Step 4 up over the center, crease.

6



Fold along the center line so that the small triangle is on the belly of the plane, crease. Fold along AB line, crease. Repeat with other side.





**Your finished plane
looks like this:**



Pilot's Secret:

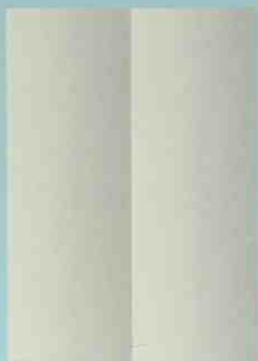
Make this plane from
a larger piece of paper
and throw it from an upper
story window. It will catch
the wind and really fly!

**Tip: Hold the plane at the nose and, using
an over arm motion, throw it so the
nose is pointing slightly up.**

the stealth

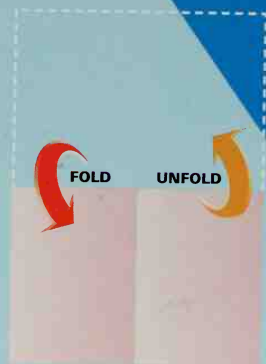


1



Lay paper vertically on tabletop, fold paper in half lengthwise, crease, unfold.

2



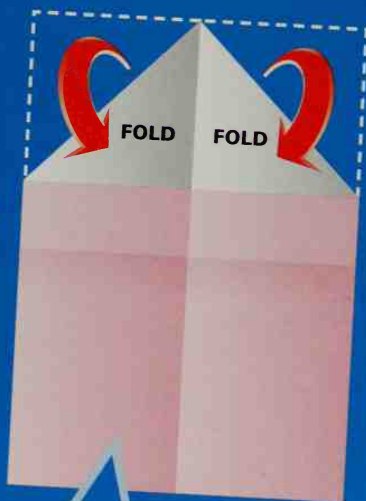
Fold paper in half, crease, unfold.



Flip paper over.



Fold the upper-right corner down so that the edge sits on the center crease, crease. Repeat with left side.



Tip: To fly this plane, cock your arm back and throw it slightly toward the ground.

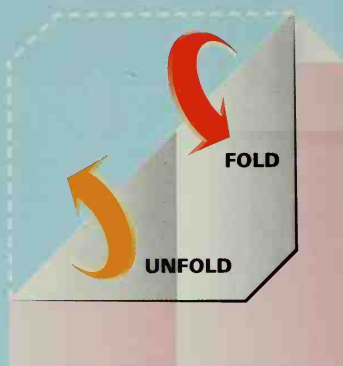
5



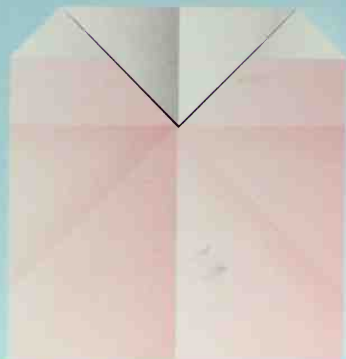
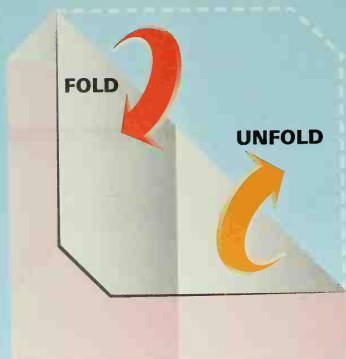
Fold the top point down so that it meets the 2 creases at the very center point.

6

**Fold the upper-left corner so that the right edge of the paper begins where the fold of the triangle is, crease...
...unfold...**

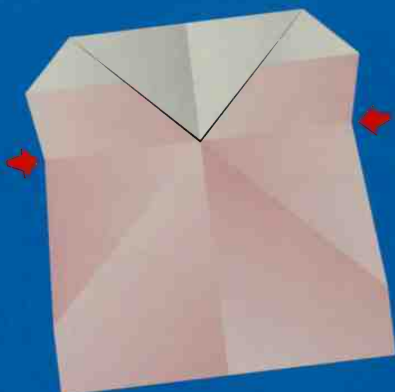


Repeat with upper-right side.

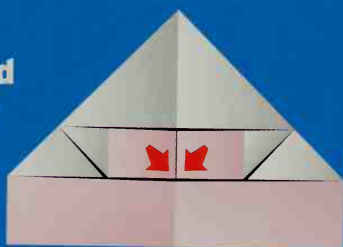




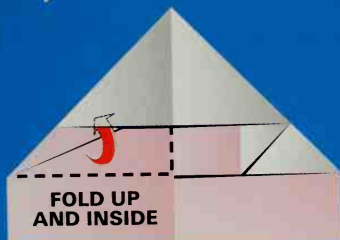
Place paper flat and pull up (where the diagram shows the red arrows) on both sides of the paper moving the red arrows toward each other.



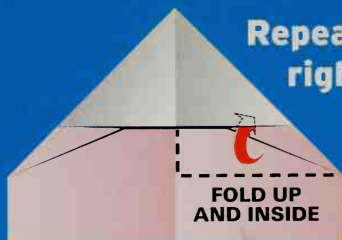
The red arrow edges will fold down into the middle crease and rest together on the fold of the middle crease.



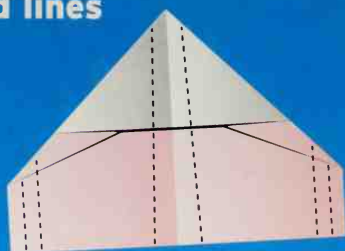
Fold the inner triangle up and inside.



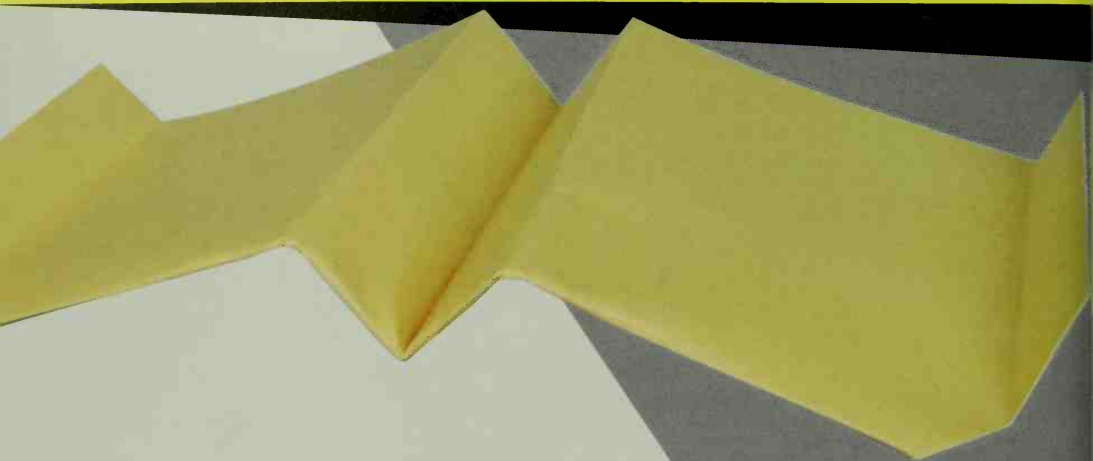
Repeat for right side.



Fold on dotted lines to finish.



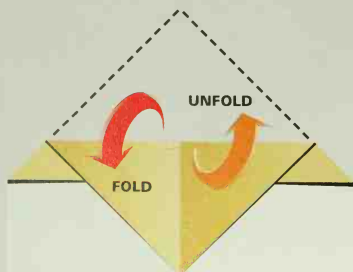
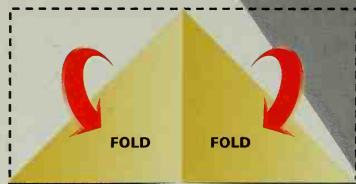
wide wing



1 Lay paper horizontally on tabletop, fold in half widthwise, crease, unfold.



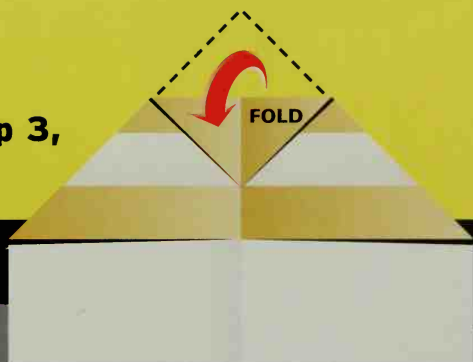
2 Fold top two corners to meet center fold line, crease.



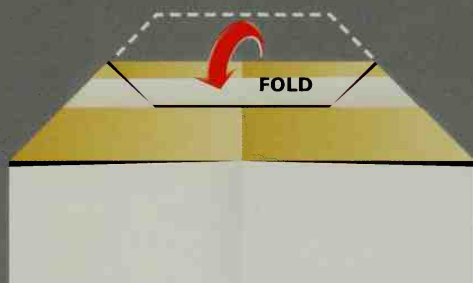
3 Fold top triangle down over center to meet lower edge, crease, unfold.

4

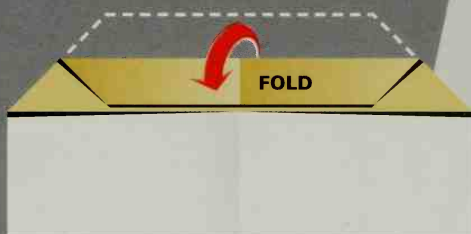
Fold point to meet crease made in Step 3, crease.

**5**

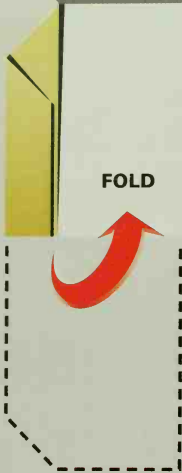
Fold top again to meet crease made in Step 3, crease.

**6**

Fold edge again so crease made in Step 3 becomes a fold, crease.



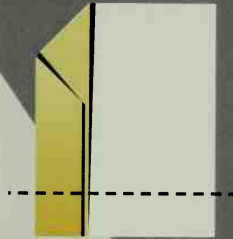
Tip: Hold this plane near the nose with your thumb and index finger. Lightly release it at eye level.



Fold plane in half so edges match exactly, crease.



About 1" (2.5 cm) from center fold, fold each wing, crease.



Note: Make sure wings line up.



Fold up edges of wings about 1" (2.5 cm) from the end of the wings.



the bull dog



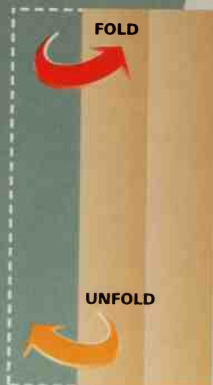
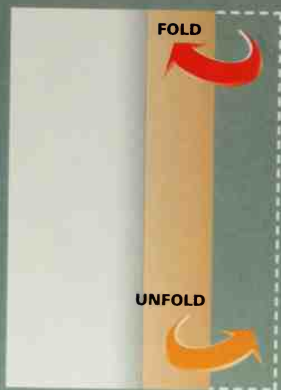
1



Lay the paper vertically on tabletop, fold in half, crease, unfold.

2

Fold right-hand side of paper to meet center crease, crease new fold. Repeat with left-hand side.



3



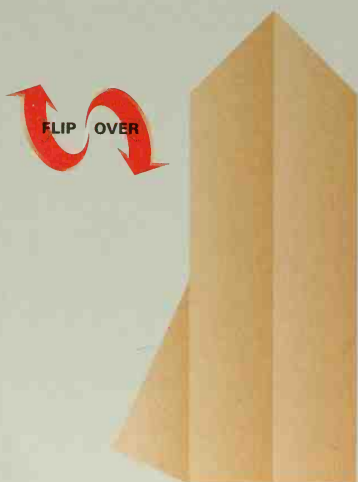
Fold upper right-hand corner so that the corner tip meets the center crease, crease new fold. Repeat with upper left-hand corner.

4

Hold down the upper right-hand triangle created in Step 3, fold inside edge of right long flap up from the inside corner, crease.



5



Flip the paper over and fold the right half onto the left side. Crease new fold.



6

FOLD
UP

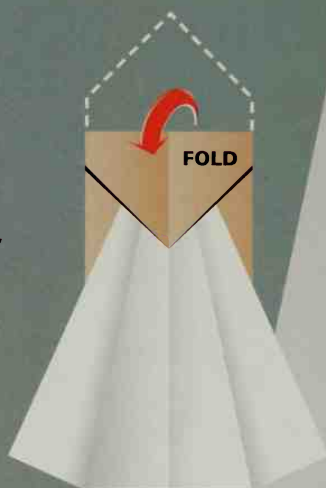
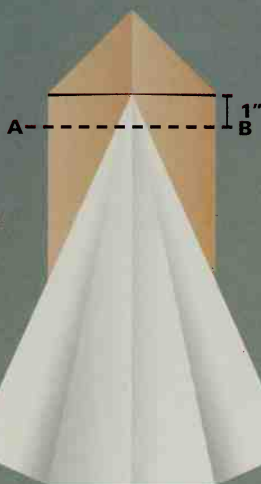
Fold the top, long flap over so that it is directly on top of the flap folded in Step 4, crease. Open at center fold and lay flat.



Note: Make sure all edges are even.

7

Mark line AB about 1" (2.5 cm) from bottom of folded triangle. Fold the top of the triangle down so that the tip meets the center crease. Crease new fold.



FOLD

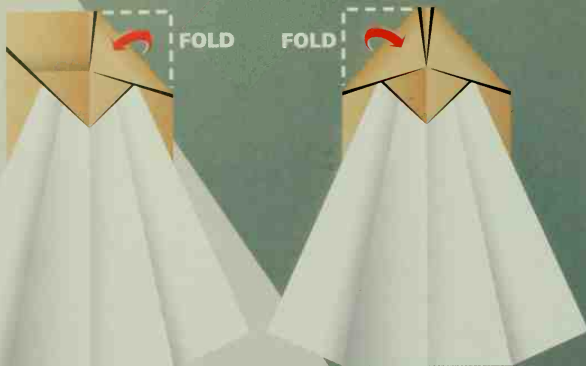
8



UNFOLD

Fold the triangle point back up so that tip meets the edge of the paper, crease, unfold.

9



Fold top right corner so the tip meets the new crease. Crease new fold. Repeat with top left corner.

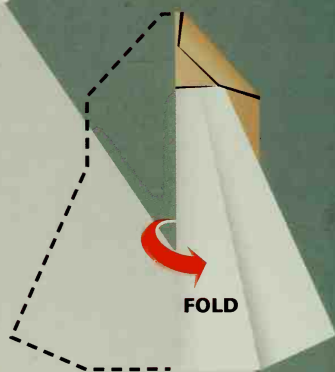
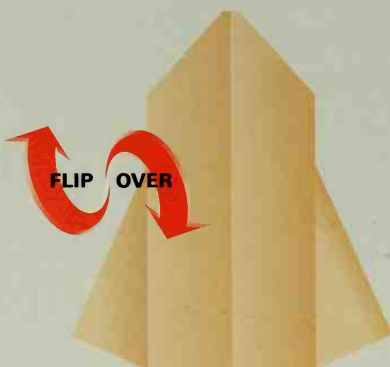
10



Fold the small triangle up, matching the tip to the center crease. Crease new fold.

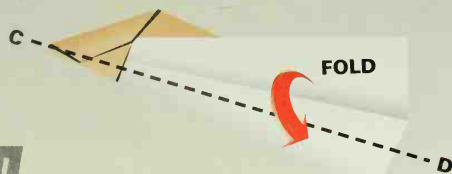
11

Flip paper over. Fold in half from left to right, crease.



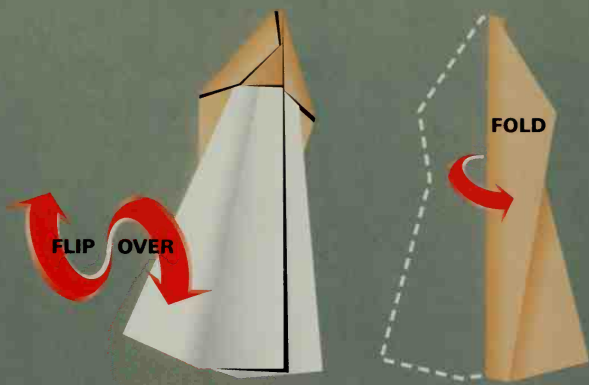
12

Fold the wing along line CD, crease.



13

Line left edge up with right edge, flip plane over. Fold the second wing by lining up the edge with wing below it. Crease new fold.



14

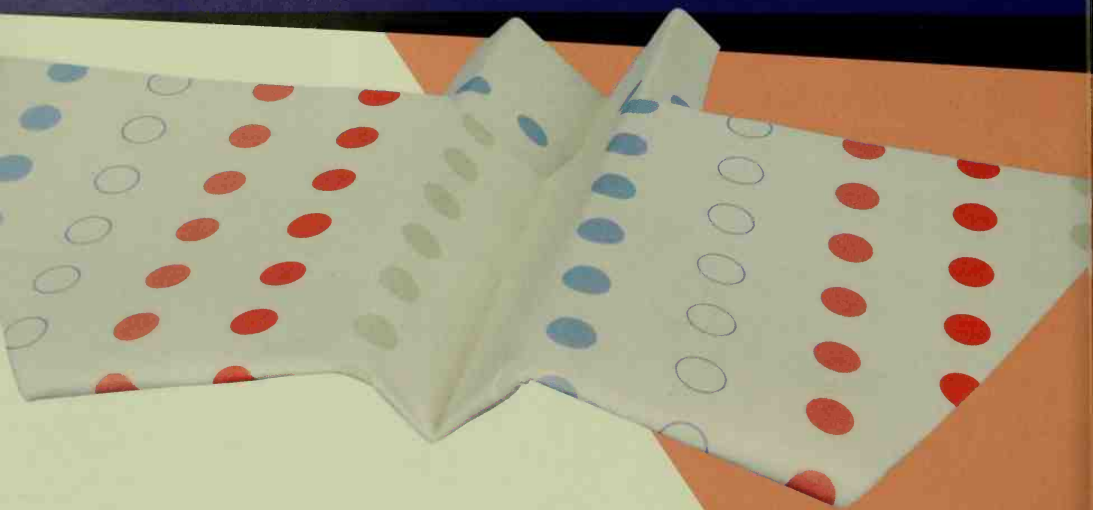
Your finished plane should look like this from the tail:



Pilot's Secret:

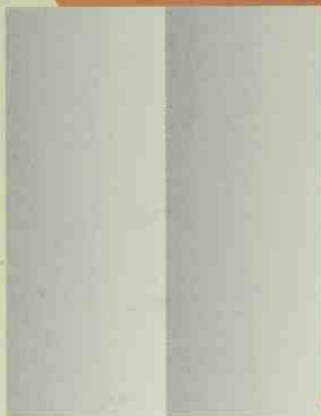
You may have to trim the wings to make this plane fly straight, but once they are adjusted, this will be the straightest-flying plane ever!

Wing glider

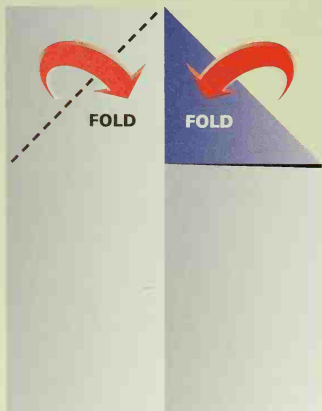


1

Lay paper vertically on tabletop. Fold paper in half lengthwise, crease, unfold.



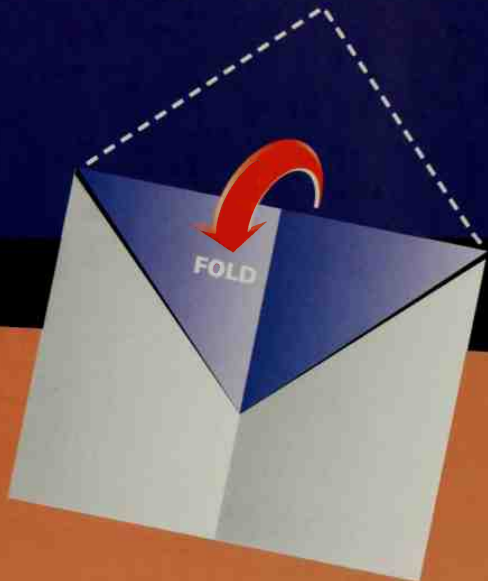
2



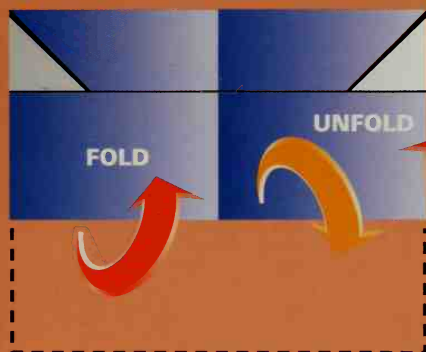
Fold top two corners to meet center fold line, crease.



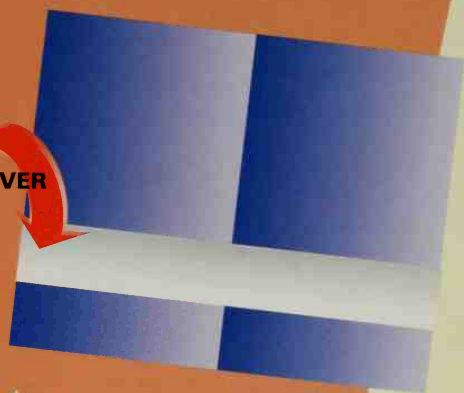
Fold top triangle down over center, crease.



Fold the bottom of the paper up so that fold meets the point of the triangle, crease, unfold and flip over.



FLIP OVER

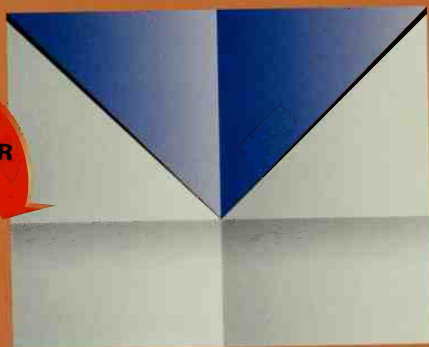
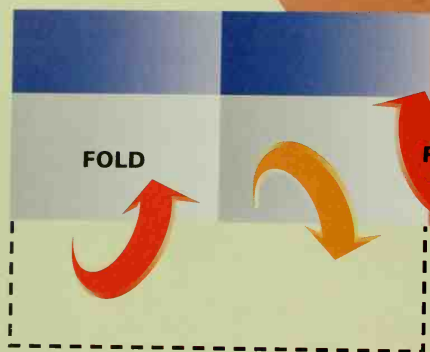


Tip: Point this plane up and use a hard throw.





Fold the bottom of the paper up on the fold line created in Step 4, crease, unfold, flip over.

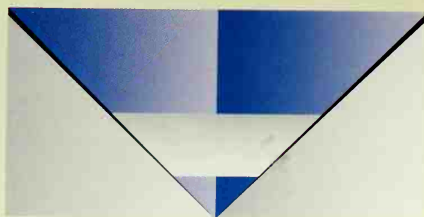
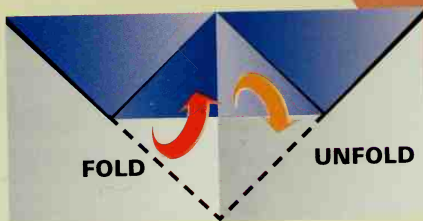


Carefully cut or tear paper along the crease. Keep excess paper.

Note: Small tears in the main part of the plane are okay, but large ones will disrupt flight and you will need to start again!

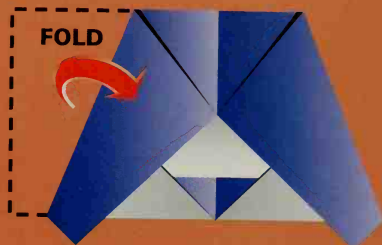
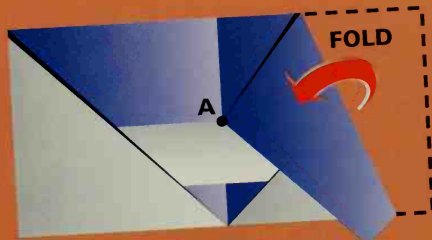


Fold the triangle point to the top center edge, crease, unfold.





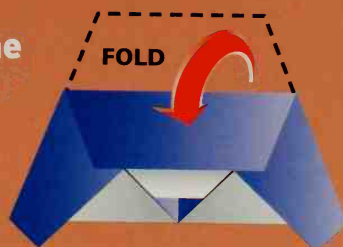
Fold the top-right corner to the A point in the middle, crease. Repeat with left side.



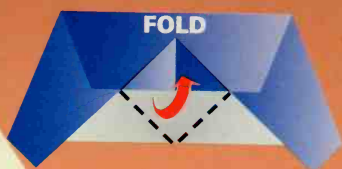
Fold the point in the center up as far as you can, crease, unfold.



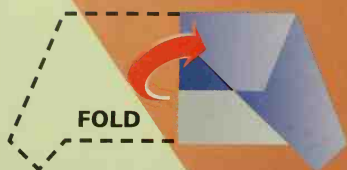
Fold the top edge of the paper so that it meets the crease created in Step 9, crease.



Fold the tip back up along fold line, crease, flip over.



12



Fold plane in half, crease.

13



Take scrap of paper saved from Step 6, fold in half lengthwise, crease.

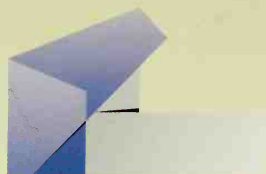
14

Carefully cut or tear scrap along short crease created in Step 1.



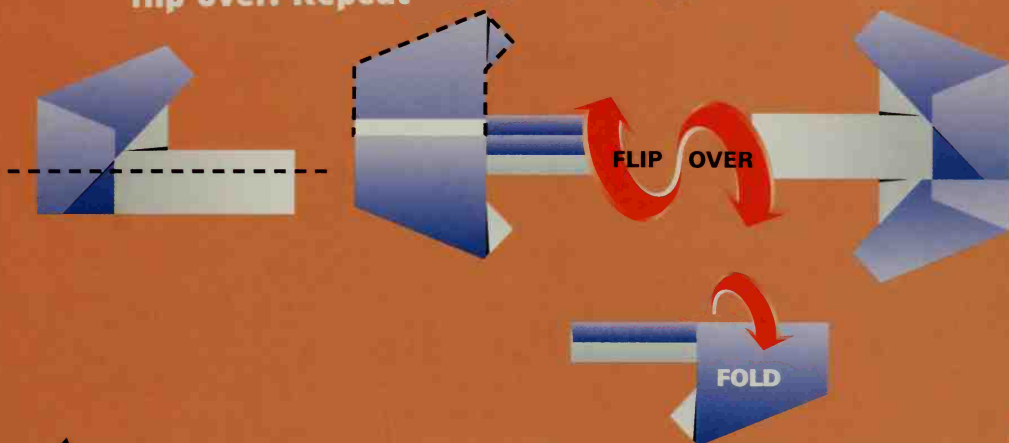
15

Tuck one half of the scrap into the top flap of the plane's body. Throw the other piece away.



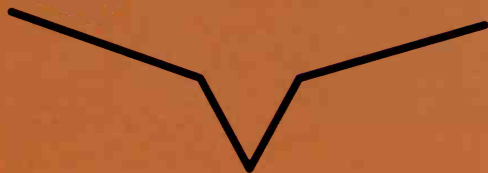
16

Fold the wing so about 1/4" (.25 cm) of the tail gets folded over, crease parallel to plane body, flip over. Repeat



17

Unfold so plane looks like this from the tail end:



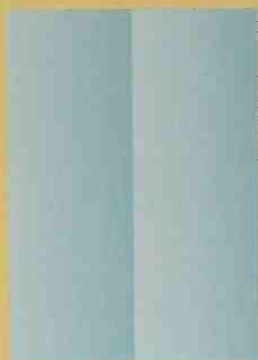
Pilot's Secret:

Put an elevator in one wing to make circles and corkscrews, or in both wings for loops.

the ski plane



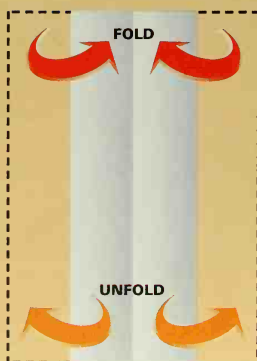
1



Lay paper vertically on tabletop, fold paper in half lengthwise, crease, unfold.

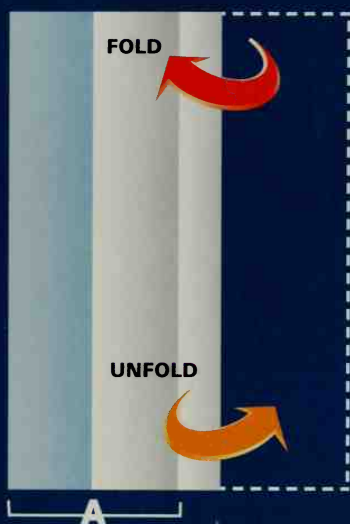
2

Fold right edge of paper to meet center fold, crease. Repeat with left edge, unfold.





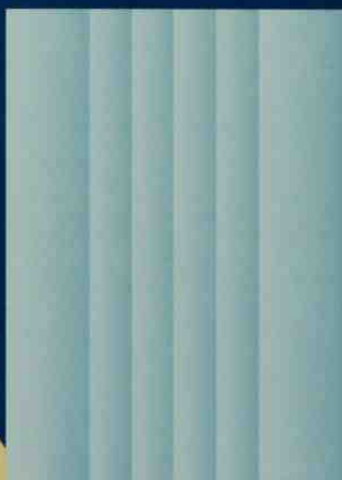
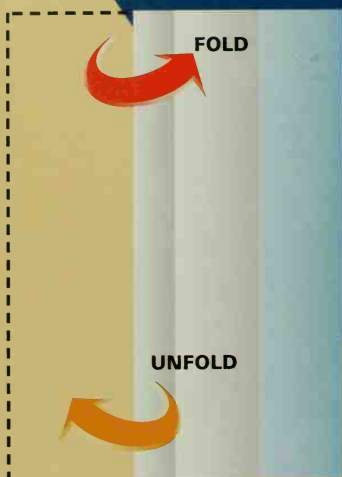
Fold right edge of paper to meet the first crease on the left-hand side. This creates a fold that is in the center of section A. Crease, unfold.



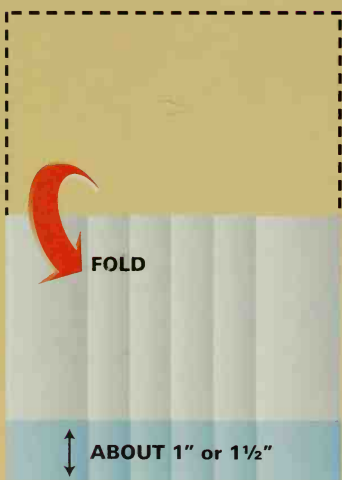
Tip: This airplane requires strong paper than normal paper airplanes to increase stability.



Repeat with left side, unfold.

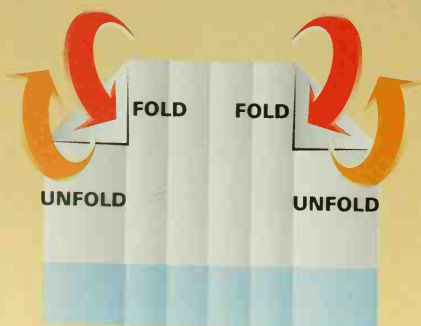


4



Fold paper so that the top edge is about 1" (2.5 cm) from the bottom edge of the paper.

5

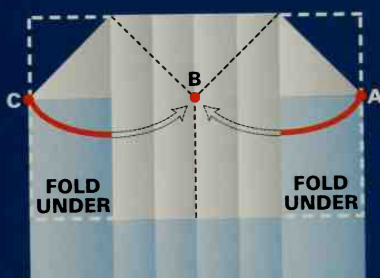


Fold upper right-hand corner so that edge meets first fold, crease, unfold. Repeat with upper left-hand corner.

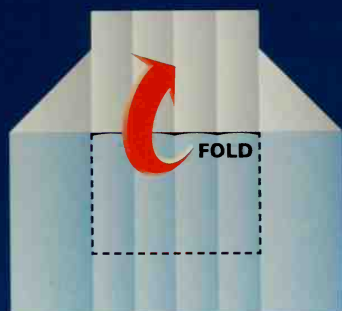
Step 5 unfolded. Prepare for Step 6 by grabbing a hold of the top paper at point A.



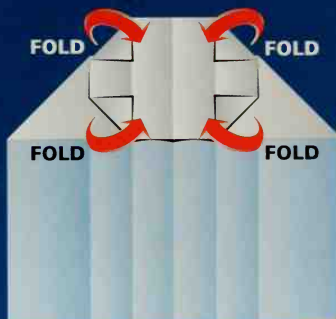
As you hold point A, swing and fold it under until point A meets point B. Then take point C and repeat until it meets point B. Make sure your plane looks like the diagram to the right.



Fold the middle section up and crease it.

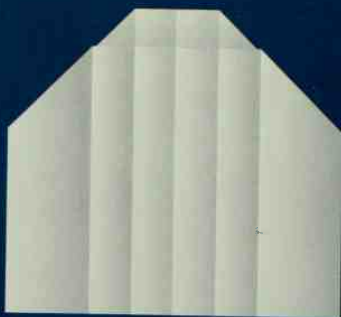


In the small square area at the top, fold each corner diagonally so that the vertical edge is lined up with the first crease lines on each side, crease.



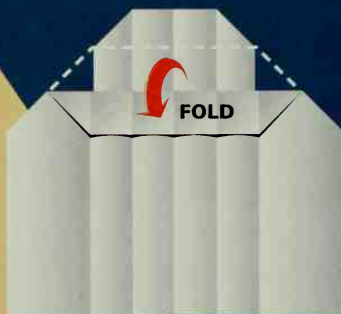
9

Flip plane over.



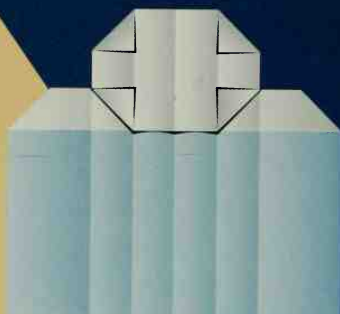
10

Fold top part over to meet with the bottom of the upper triangle shape.



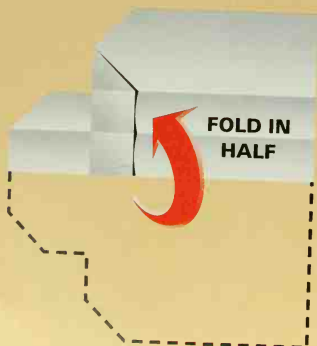
11

Flip plane over.



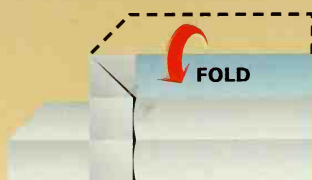
12

Fold the plane in half along the middle crease line and crease it.

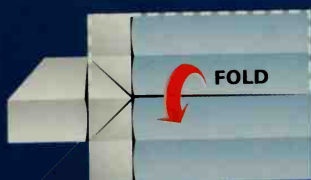


13

Fold the top fin down to line up with the next crease down. Repeat for other side.



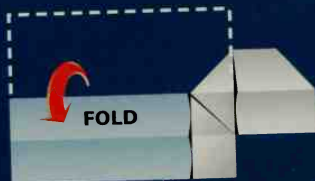
14



Fold the wing down along the bottom crease.

15

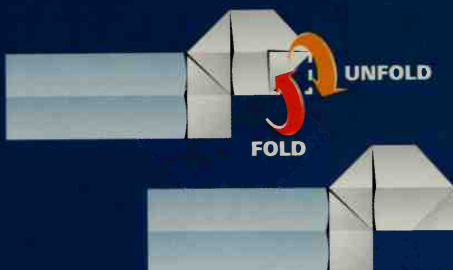
Flip plane over...



...and fold the wing down along bottom crease to match other folded wing.

16

Fold lower nose section diagonally to middle crease, unfold.



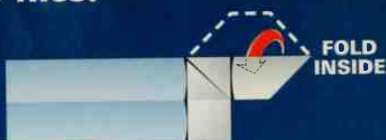
17

Fold lower nose section diagonally inside middle section.



18

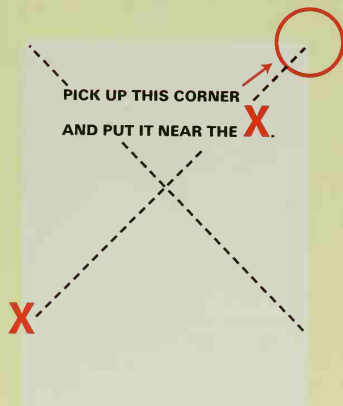
Fold upper nose section inside middle section. Repeat for other side. You are now finished folding the Ski Plane. Try it out and see how it flies.



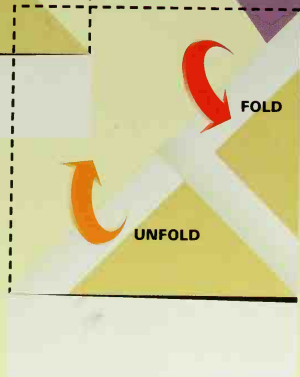
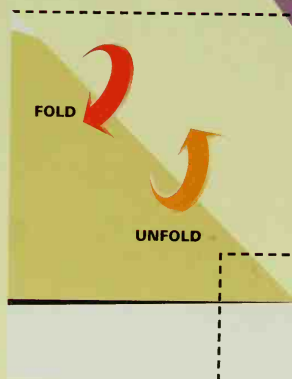
the starship



1



...crease,
unfold. Repeat
with upper
left-hand
corner.

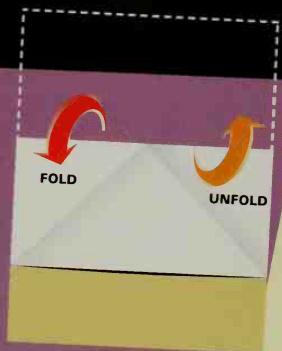


Place paper vertically
on tabletop. Mark X on lower
left-hand side of the page
to about 2" (5 cm) from the
bottom. Fold upper right-hand
corner to meet the X...

QUATERO

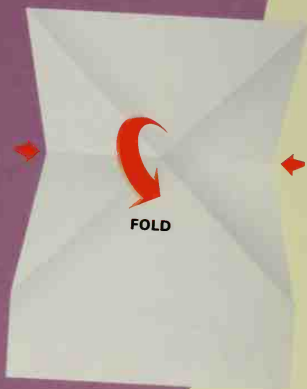
2

Flip your paper over. Fold the top of the paper down and match the corners with the bottom of the creased X, crease, unfold.



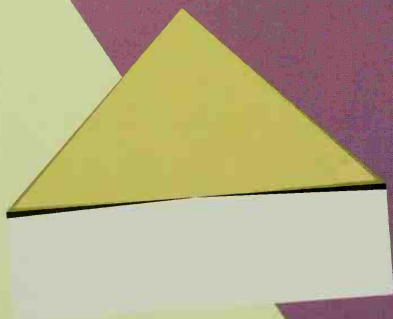
3

Flip the paper over and lay it flat on the tabletop. Press the middle of the creased X and push up the sides where indicated by the red arrows in the diagram. Fold the top over.



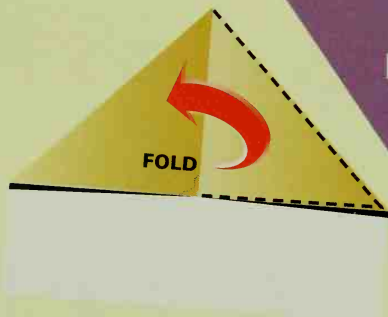
Tip: Aim this plane anywhere starting at eye level up and give a good hard throw.

4



Pull the top edge of the paper toward the center, making the sides of the paper fold inward along the horizontal crease, crease.

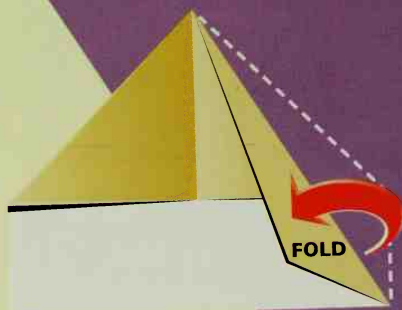
5



Fold the bottom-right corner of the top layer of the triangle to meet the bottom-left corner of the triangle, crease.

6

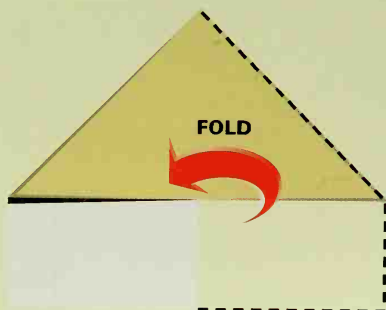
Fold the new bottom-right corner of the triangle in so that the fold is from the top of the triangle to the lower-right corner of the paper, crease.



7



Flip the paper over, then fold the top flap of the right side of the paper in half. Crease new fold.

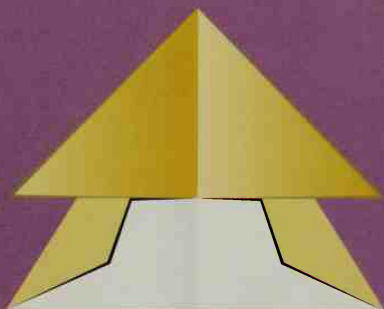
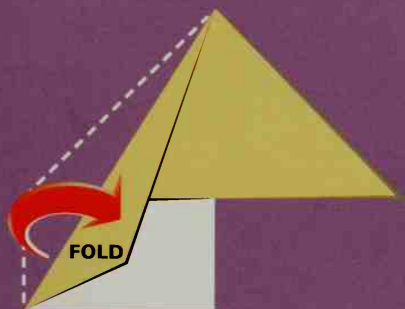


Note: Make sure bottom edges are perfectly lined up.

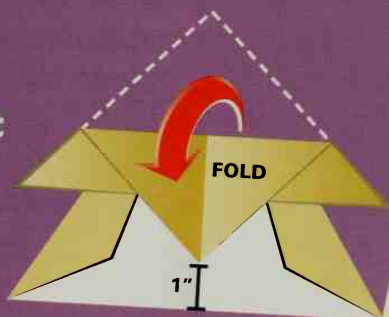


Repeat Step 6 with the left-hand corner, crease, unfold.

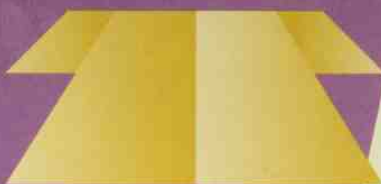
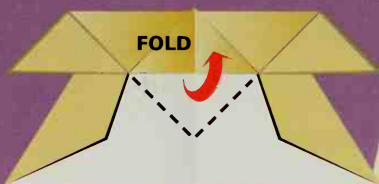
Note: Make sure the left fold is directly on top of the right fold.

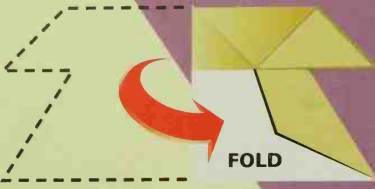


Fold triangle down so that the point is on the center crease about 1" (2.5 cm) from the bottom, crease.



Fold the same triangle up so the point is in the center crease at the top of the paper, crease.





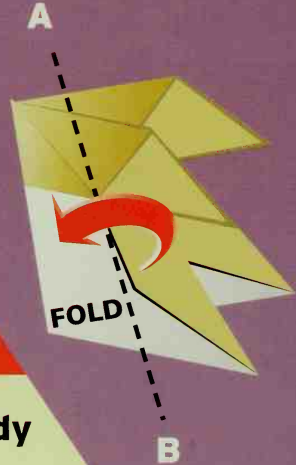
Fold the paper in half from left to right, crease.

Note: Make sure the edges are lined up.



Fold the paper at a sharp angle on line AB, crease. This is now the wing.

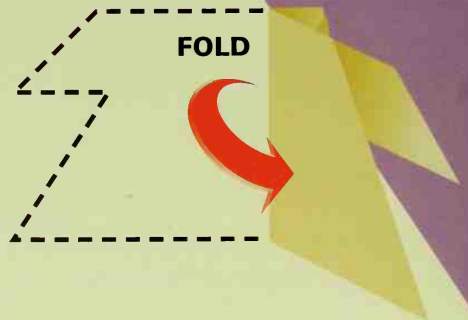
Note: The tail should be approximately twice the size of the nose.



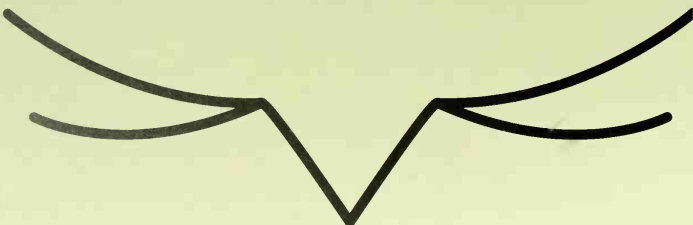
The edge of the wing and the body should be parallel.



Flip the paper over, repeat Step 12 folding the second wing lining it up with the first, crease, unfold.



Your plane should look like this from the tail:





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